WHAT IS CLAIMED IS:

1. A manifold system for an injection molding system, the manifold system comprising:

a main manifold (56) having a plurality of arms (64) and a main melt channel (62) therein branching to each arm (64), with an outlet (63) at each arm (64);

at least one sub-manifold (52) spaced from the main manifold (56), each sub-manifold (52) having an inlet (65) and a plurality of secondary melt channels (104) in communication with the inlet (65);

a plurality of melt transfer bushings (68), each melt transfer bushing (68) disposed between one sub-manifold (52) and one arm (64) of the main manifold (56), each melt transfer bushing (68) providing communication between the inlet (65) of said one sub-manifold (52) and the outlet (63) of said one arm (64);

a backing plate (58);

a manifold plate (54) spaced form the backing plate (58);

an air plate (70) disposed between the backing plate (58) and the manifold plate (54) and disposed between the main manifold (56) and the at least one sub-manifold, the air plate (70) having a plurality of actuator cavities (72) for receiving actuators (90), the air plate (70) having s a plurality of air channels (74) communicating with the actuator cavities (72) for conducting fluid, in use, to actuators (90).

2. The manifold system of claim 1, wherein the main manifold (56) is housed in the backing plate (58).

3. The manifold system of claims 1 or 2, wherein the at least one sub-manifold (52) is housed in the manifold plate (54)

4. The manifold system of any of the preceding claims, wherein the air plate (70) has a plurality of cooling channels (84) for conducting fluid, in use, to cool the air plate (70).

5. The manifold system of claim 4, wherein the cooling channels (84) are proximate the actuator cavities (72).

6. The manifold system of any of the preceding claims, wherein the air plate (70) has a plurality of air plate bolt holes (78) which receive bolts (76) to secure the air plate (70) to the manifold plate (54).

7. The manifold system of claim 6, wherein some of the air plate bolt holes (78) are disposed directly beneath the main manifold (56).

8. The manifold system of any of the preceding claims, wherein the backing plate (58) has a plurality of backing plate bolt holes (82) which receive bolts (80) to secure the backing plate (58) to the air plate (70).

9. The manifold system of claim 8, wherein some of the backing plate bolt holes (82) are disposed directly above a sub-manifold (52).

10. The manifold system of any of the preceding claims, further comprising a plurality of valve gate nozzles (92, 120) connected to each sub-manifold (52), each nozzle (92, 120) having a melt channel (108, 122, 124) in communication with a secondary melt channel (104) in a sub-manifold (52), each nozzle (92,120) having an actuator (90) disposed in one of the actuator cavities (72).

11. The manifold system of claim 9 or 10, wherein each sub-manifold has a plurality of manifold bushings (94, 126), each manifold bushing (94, 126) being aligned with one of the nozzles (92, 120) and providing the communication between the melt channel (108, 122, 124) in the nozzle (92, 120) and the secondary melt channel (104) in the sub-manifold (52).

12. The manifold system of claim 11, wherein each manifold bushing (94) receives a valve stem (110) extending from one of the actuators (90), through the manifold bushing (94), and through the nozzle (92), the valve stem (110), in use, being moved by the actuator (90) to start and stop the flow of molten material through the nozzle (92).

13. The manifold system of claim 11 or 12, wherein each manifold bushing (94) has a flat sealing surface (100), and wherein each nozzle (92) has a non-flat sealing surface (98) adjacent the flat sealing surface (100) of the manifold bushing (94).

14. The manifold system of claim 13, wherein the non-flat sealing surface (98) is a raised conical surface around a melt channel (108) of the nozzle (92) angled less than one degree from planar.

15. The manifold system of any of the preceding claims, wherein the main manifold (56) has a flat sealing surface (160), and wherein the melt transfer bushing (68) has a non-flat sealing surface (162) adjacent the flat sealing surface.

16. The manifold system of claim 15, wherein the non-flat sealing surface (162) is a raised conical surface around the melt channel (148) of the melt transfer bushing (68) angled less than one degree from planar.

17. The manifold system of any of the preceding claims, wherein each melt transfer bushing (68) has a melt channel (148) therein and further comprising a static mixer (140) disposed in the melt channel (148).

18. The manifold system of any of the preceding claims, wherein each melt transfer bushing (68) has a heating device (150).

19. The manifold system of claim 18, wherein the heating device (150) is one of:

an electric heater; and

at least one heat pipe arranged to transfer heat from the main manifold (56) and a sub-manifold (52) to the melt transfer bushing (68).

20. The manifold system of any of the preceding claims, further comprising:

at least one centering feature (159), each centering

feature (159) being associated with a melt transfer bushing (68) and acting between the air plate (70) and the melt transfer bushing (70) to facilitate sliding of melt transfer bushing (68) relative to main manifold (56) at their interface (156) when there is relative lateral motion between sub-manifold (52) and main manifold (56).

21. A manifold system for an injection molding system, the manifold system comprising:

a main manifold (56) having a main melt channel (62) therein with an outlet (63);

a sub-manifold (52) spaced from the main manifold (56), the sub-manifold (52) having an inlet (65) and a plurality of secondary melt channels (104) in communication with the inlet (65);

a melt transfer bushing (68), disposed between the sub-manifold (52) and the main manifold (56), the melt transfer bushing (68) providing communication between the inlet (65) of the sub-manifold (52) and the outlet (63) of the main manifold (56);

a backing plate (58);

a manifold plate (54) spaced form the backing plate (58);

an air plate (70) disposed between the backing plate (58) and the manifold plate (54) and disposed between the main manifold (56) and the sub-manifold, the air plate (70) having a plurality of actuator cavities (72) for receiving actuators (90), the air plate (70) having s a plurality of air channels (74) communicating with the actuator cavities (72) for conducting fluid, in use, to actuators (90).